



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/943,150	08/30/2001	Daniel P. DeLuca	01-415	8646

7590 12/28/2004

Barry L. Kelmachter  
BACHMAN & LaPOINTE, P.C.  
Suite 1201  
900 Chapel Street  
New Haven, CT 06510-2802

EXAMINER

WILKINS III, HARRY D

ART UNIT

PAPER NUMBER

1742

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/943,150	<b>Applicant(s)</b> DELUCA ET AL.	
	<b>Examiner</b> Harry D Wilkins, III	<b>Art Unit</b> 1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 April 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 24-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 24-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-3 and 5, as well as claim 4 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification as filed does not contain support for the new claim limitation of claims 1 and 4 that the rhenium is limited to "less than 5.0 wt%". This is a change in scope from that presented in the specification as filed which recites "up to 5.0 wt%", and thus specifically includes 5.0 wt% which is excluded by the present claim language.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erickson (US 5,366,695) in view of Kenton (US 4,302,256).

Erickson teaches (see abstract and title) a single crystal nickel-based superalloy that contains 1.8-4.0 wt% Cr, 0.25-2.0 wt% Mo, 3.5-7.5 wt% W, *about* 5.0-7.0 wt% Re, 7.0-10.0 wt% Ta, 5.0-7.0 wt% Al, 1.5-9.0 wt% Co, 0-0.15 wt% Hf, 0-0.5 wt% Nb (columbium), 0.1-1.2 wt% Ti and the balance Ni. Erickson further teaches (see col 2, lines 44-56) that the alloy may contain 0-0.04 wt% C, 0-0.01 wt% B, 0-0.01 wt% Zr and 0-0.1 wt% V. This composition overlaps the presently claimed range at 3.0-4.0 wt% Cr, 0.25-2.0 wt% Mo, 3.5-7.5 wt% W, *about* 5.0 wt% Re, 7-10 wt% Ta, 5-7 wt% Al, 1.5-9.0 wt% Co, 0-0.04 wt% C, 0-0.01 wt% B, 0-0.01 wt% Zr, 0-0.15 wt% Hf, 0-0.5 wt% Nb, 0-0.1 wt% V and 0.1-0.7 wt% Ti. Regarding the presence of at least one of Ru, Rh, Pd, Os, Ir and Pt, the present claim recites a range of "up to 10 wt%" which includes zero addition of the element. Erickson teaches (see table 4) that the process includes a step of solutionizing wherein up to 100% of the  $\gamma'$  is taken into solution. Thus, the superalloy of Erickson is free from eutectic  $\gamma - \gamma'$ .

Though Erickson teaches (see col 37, lines 55-58) that the alloy is subjected to HIP (hot isostatic pressing) in order to facilitate "nearly complete pore closure" Erickson does not teach a step of HIPping that is at a pressure similar to that of the present invention. The "nearly complete pore closure" of Erickson does not mean pore-free.

Kenton teaches (see abstract) a method of removing cast defects, such as micropores, in superalloys by subjecting the alloy to an HIP treatment. Kenton teaches (see col 5, lines 58-68) that the HIP treatment occurs at 1800-2350°F at 5-50 ksi. This treatment improves the mechanical properties of the alloy, including (see col 5, line 68 to col 6, line 17) the substantially complete removal of defects such as micropores.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the HIP treatment of Kenton to the alloy of Erickson because the HIP treatment of Kenton improves the mechanical properties of the alloy by removing casting defects such as pores (see abstract and col 5, line 68 to col 6, line 17). Thus, the alloy of Erickson in view of Kenton is pore-free.

Regarding claim 2, Erickson teaches (see col 11, line 63 to col 12, line 21) that the alloy is treated to produce primary gamma prime particles and also secondary gamma prime particles with an ultra-fine size. Thus, Erickson teaches an alloy with a gamma prime morphology with a bimodal  $\gamma'$  distribution.

Regarding claim 5, Erickson teaches (see title) that the superalloy is a single crystal.

5. Claims 3, 4, 6-11 and 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erickson (US 5,366,695) in view of Kenton (US 4,302,256) as applied to claims 1, 2 and 5 above, and further in view of DeLuca et al (US 5,605,584).

As described above, Erickson in view of Kenton teach the eutectic  $\gamma$ - $\gamma'$  free and pore free super alloy as claimed.

Erickson in view of Kenton do not teach the sizes and volume percent distribution of the  $\gamma'$  precipitates as claimed. However, given the teaching of Erickson (see col 11, line 66 to col 12, line 21), it would have been within the expected skill of a routineer in the art to adjust the  $\gamma'$  aging condition in order to obtain a desirable  $\gamma'$  particle size such as that disclosed by DeLuca et al.

DeLuca et al teach (see abstract) forming a bimodal  $\gamma'$  precipitate distribution in a superalloy. The large particles had (see col. 3, lines 29-45) size of about 5-15 microns and were preferably present (see claim 6) at about 30-40% by volume. The small cuboidal particles have size of about 0.3-0.7 microns.

Therefore, it would have been obvious to one of have incorporated the bimodal  $\gamma'$  precipitate distribution of DeLuca et al in the alloy of Erickson because the bimodal  $\gamma'$  distribution provides (see abstract) a microstructure that was damage tolerant, thus leading to a longer workpiece lifetime.

Regarding claims 4 and 11, DeLuca et al teach (see col. 3, lines 33-34) that the smaller  $\gamma'$  precipitates are cuboidal in shape. DeLuca et al teach (see col. 3, lines 44-45) that the large  $\gamma'$  precipitates have a branched configuration with three or four branches. The four-branched precipitates are "octet-shaped" precipitates as claimed.

Regarding claims 6, 10 and 24, Erickson teaches (see col 11, line 63 to col 12, line 21) that the alloy is treated to produce primary gamma prime particles and also secondary gamma prime particles with an ultra-fine size. Thus, Erickson teaches an alloy with a gamma prime morphology with a bimodal  $\gamma'$  distribution. Combined with the teachings of DeLuca et al (specifically in the abstract and col. 3, lines 46-50) of restraining crack propagation, one of ordinary skill in the art would have expected the alloy of Erickson in view of Kenton and DeLuca et al to have the ability to resist initiation and subsequent propagation of fatigue cracks in a hydrogen environment as claimed.

Regarding claim 25, see above regarding claims 4 and 24.

Regarding claim 26, see above regarding claims 1 and 24.

***Response to Arguments***

**6** Applicant's arguments filed 19 April 2004 have been fully considered but they are not persuasive. Applicant argued that:

- a. Erickson discloses "about 5.0 wt% to 7.0 wt% rhenium" as compared to the present claim language that requires "less than 5.0 wt% rhenium".

In response, since Erickson teaches "about" 5.0 wt% rhenium as the lower limit, the disclosure of Erickson et al also includes amounts of rhenium that are "about 5.0 wt%", but still below 5.0 wt%, i.e.-within the presently claimed range.

- b. None of the alloys disclosed in Erickson, Kenton or DeLuca et al ('584) are capable of resisting both the initiation and subsequent propagation of fatigue cracks in a hydrogen atmosphere.

In response, with respect to the property of resistance to initiation and propagation of fatigue cracks, the composition taught by Erickson overlaps the presently claimed composition and the method of production taught by Erickson in view of Kenton and DeLuca et al is substantially identical to the method disclosed in the specification, therefore, one of ordinary skill in the art would have expected that the products taught by the references would inherently have the same resistance to initiation and propagation of fatigue cracks as claimed.

- c. DeLuca et al ('584) teach a trimodal  $\gamma'$  distribution.

In response, while DeLuca et al teach (see col. 5, lines 3-14) that the preferred embodiment produces a trimodal distribution, but that the bimodal distribution would also "be equally effective in rendering the material damage resistant". Thus, the

disclosure of DeLuca et al should not be construed as being limited only to the specific examples contained therein.

### ***Conclusion***

**7.** Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D Wilkins, III whose telephone number is 703-305-9927. The examiner can normally be reached on M-Th 10:00am-8:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V King can be reached on 703-308-1146. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



Art Unit: 1742

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Harry D Wilkins, III  
Examiner  
Art Unit 1742

hdw

ROY KING   
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700